Ireland Growth Accounting

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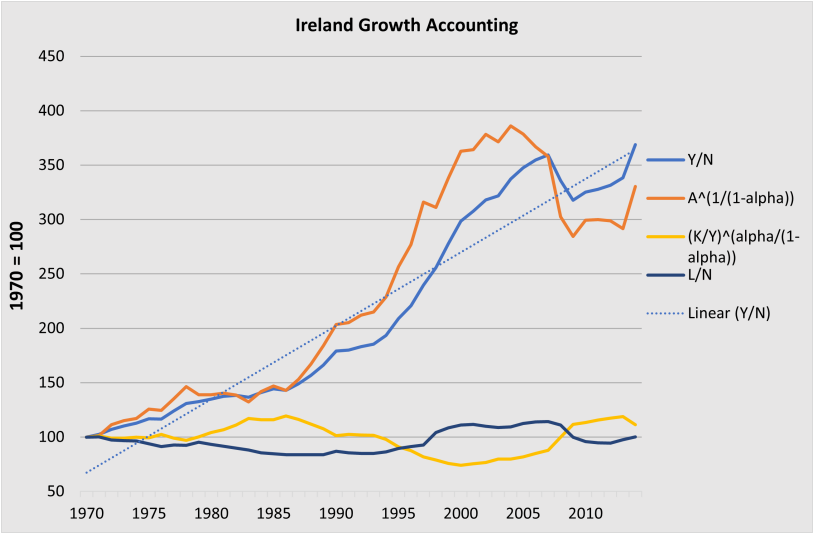
1 Introduction

According to Kehoe and Prescott, the definition of a great depression is a negative deviation from standard trend such that it satisfies three conditions: it must be sufficiently large, it must occur rapidly, and it must be sustained. For this project, I chose Ireland as my country of analysis and collected data starting from the 1970's. The results of my data and calculations show that Ireland has not been in a great depression in the last 20 years.

2 Output

Following along the lines of Kehoe and Prescott, I looked at the detrended output per working-age person beginning in the 80's to see if there had been a negative deviation capable of satisfying the definition. We can clearly see here that, even in the slump in 2005, Ireland's output per working-age person has a quick V-shaped recovery. Another observation is that, while the economy is behind the trend line for a majority of the 1980-2000 time period, this deviation (although sustained) is not rapid. Therefore, we can conclude that no criteria of the great depression definition is satisfied.

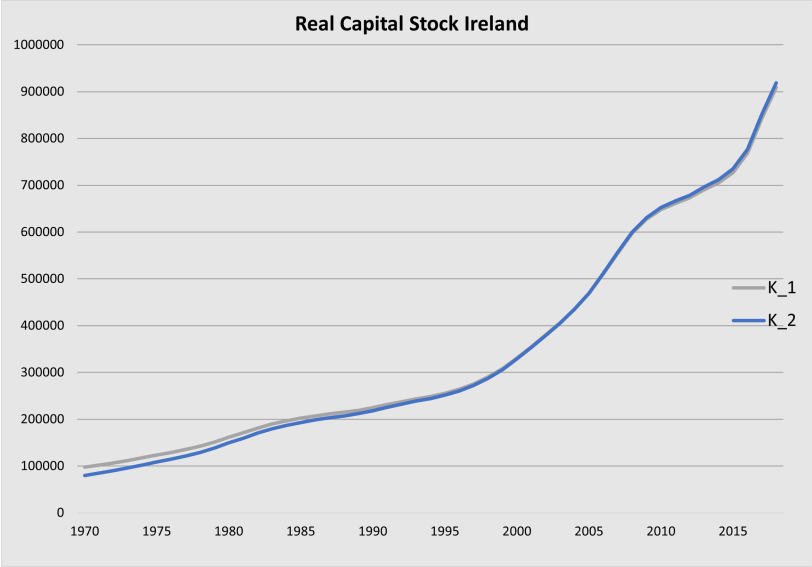


3 Time Series

Next, we use investment data to construct a time series for capital stock using the following rule:

$$K_{t+1} = (1 - \delta)K_t + I_t$$

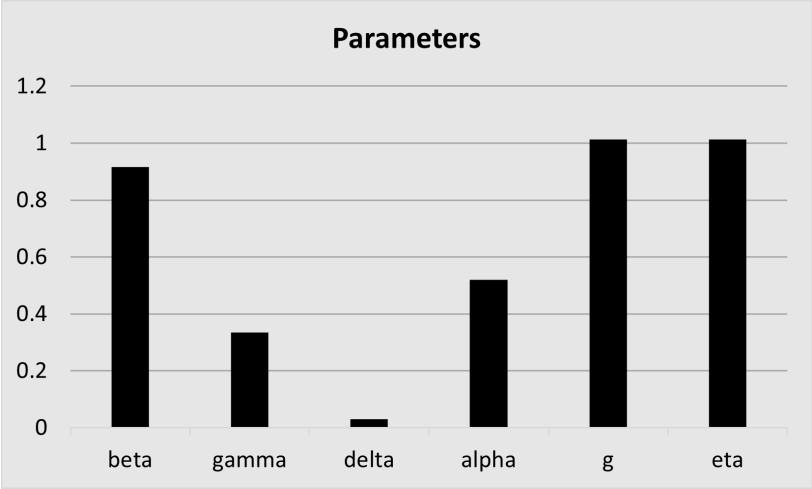
We can calibrate delta and initial capital stock using two different approaches for approximation. For the first method, I averaged the capital per output over the first ten years, 1970-1980. In the second method, I calculated the tenth year capital to initial capital as a ratio of the two raised to the power (1/10). This gave me the following results:



The K_1 series initial stock and delta values are 97,931 and 0.0303 respectively, whereas the values for K_2 are 80,000 and 0.029. Using solver and applying some deliberate constraints allowed me to closely approximate these series, and as a result, we can see that they are quite close to each other. In order to fully understand why my decomposed graphs look like this, it is helpful to look at the appropriate historical events for times of deviation. The NESC reports a high amount of exports from the 90's into the early 2000's, which may suggest why there is such a steady rise in output per worker over this period. Furthermore, in the mid 2000's, a sharp and quick decline may be the result of "the global credit market squeeze, greatly increased energy and commodity prices," as well as other factors such as a weak tax revenue.

4 Parameters

Next, we further calibrate parameters beta and gamma. Here is a plot of all parameters needed for paramBase.txt within MATLAB:



Here, we assume values of beta and gamma to be their averages over the years 1970-2014. Beta and gamma are calculated in the following manner:

$$beta = \frac{C_{t+1}}{C_t} * \frac{1}{1 + r_{t+1} - \delta}$$

$$gamma = \frac{C_t}{C_t + w_t(N * 5200 - L_t)}$$

For the calculation of gamma, we multiply by 5200 as an assumption that there are 52 weeks in a year, with a maximum of 100 working hours per week. Following this, we input dataBase.txt and paramBase.txt into the MATLAB depressions and model solver. Using these results, we can plot the output from the MATLAB model against the data output. The results I obtained follow in the three graphs for $\frac{Y_t}{N_t}$, $\frac{K_t}{Y_t}$, and $\frac{L_t}{N_t}$.

5 Conclusion

From these three plots, we can summarize what happens during and after the Irish financial crisis. Beginning with $\frac{Y_t}{N_t}$, we can see that it follows the trend expected from earlier speculation. A steady, positive trend in alignment with a growing, export-heavy economy followed by a slump during the mid 2000's. For $\frac{K_t}{Y_t}$ and $\frac{L_t}{N_t}$, we get slightly different results within our dataset and model. The model data has a more stable trend over both plots, whereas the data has a slight negative trend for $\frac{K_t}{Y_t}$ beginning in the mid 90's, and an inverse positive trend for the $\frac{L_t}{N_t}$ plot. Analyzing the less stable data trend for sake of possible correlation, we can see that $\frac{K_t}{Y_t}$ has a sustained slump from the mid 90's until nearly 2010. This may be the result of an increasing output over a time period of relatively slow capital growth. If we think how it relates to the growth accounting decomposition, it makes sense that an export-heavy economy may not rely so much on heavy capital growth. Ireland's economic output could have certainly had the positive increase it did in those years without much capital gain. On the other hand, $\frac{L_t}{N_t}$ shows an increase during the late 90's lasting nearly 15 years. This means that, during the slump in the mid 2000's, labor per working-age person remained relatively high even with a decrease in output. A trend like this may be the result of having to work more in an attempt to restore output to previous levels. Although I am not an expert in economics, I do believe these results to be somewhat accurate in representing the growth accounting and general equilibrium of Ireland's economy. All data gathered was from the OECD National Accounts database.

6 Figures

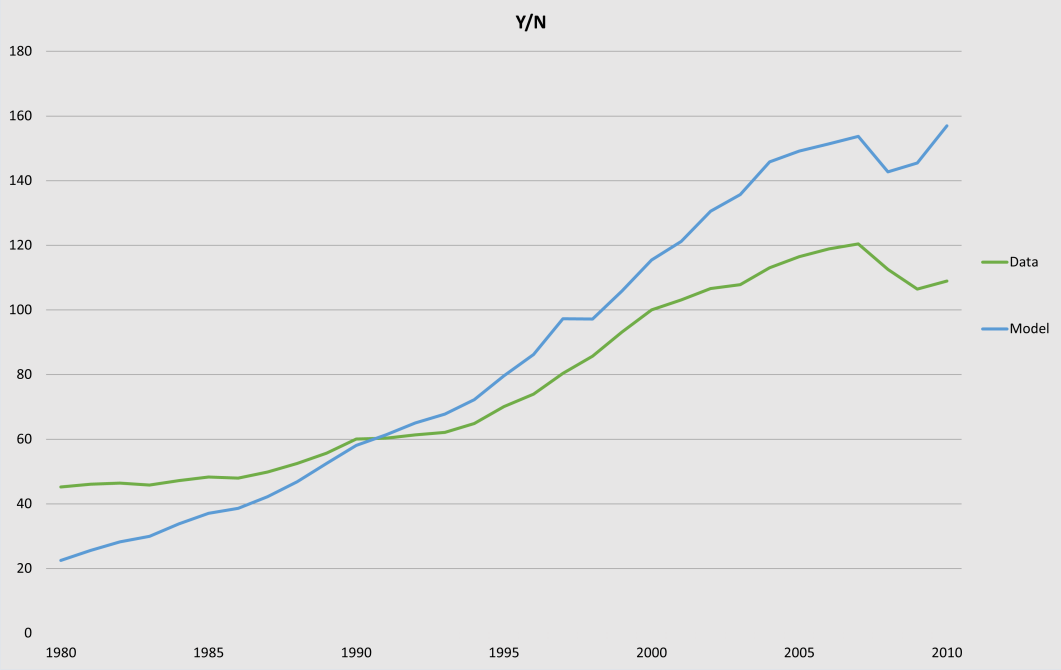


Figure 1: $\frac{Y_t}{N_t}$

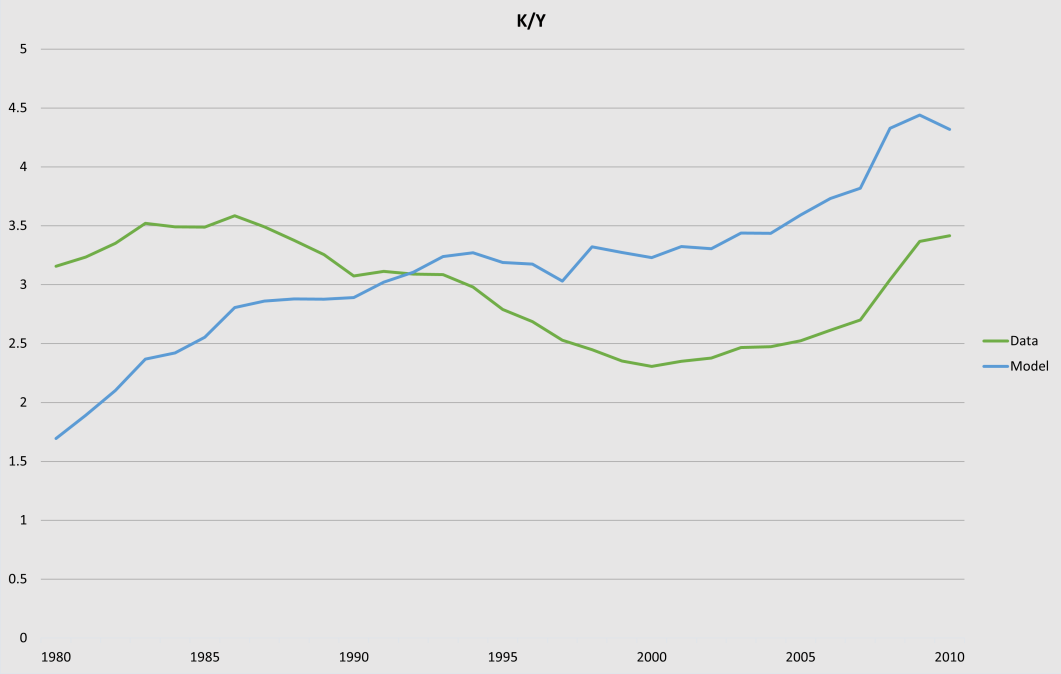


Figure 2: $\frac{K_t}{Y_t}$

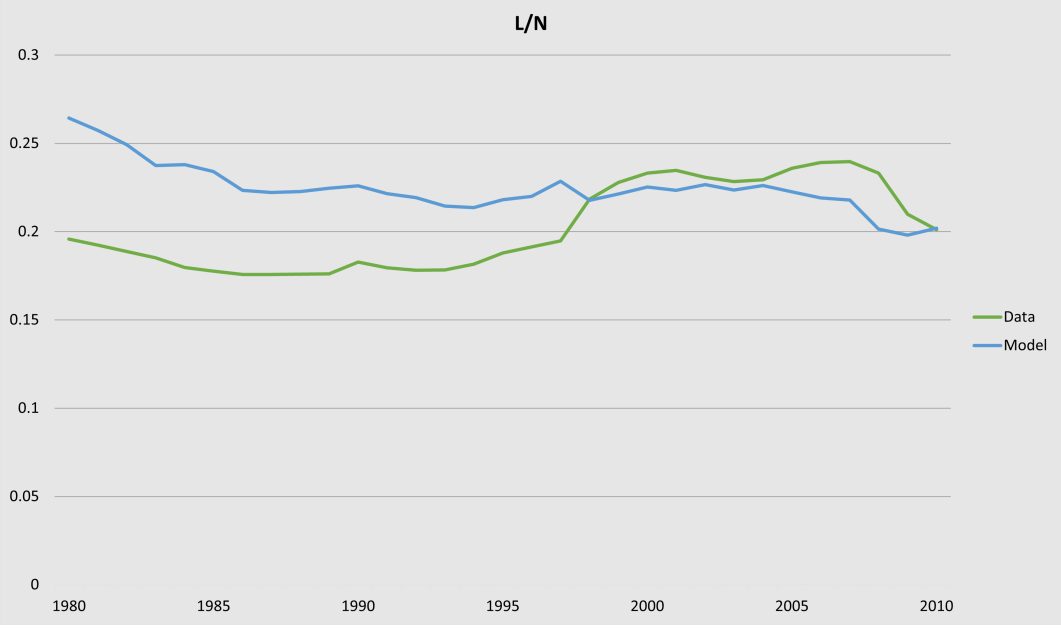


Figure 3: $\frac{L_t}{N_t}$